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Cash flow vs. collateral-based credit

Performance of micro, small and medium-sized firms in transition economies[1]

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Abstract

We study factors affecting micro, small and medium-sized enterprises (MSMEs) receiving loans and the effect of these loans on MSMEs performance. We study two types of loans – a new type based on cash flows and a traditional-style loan based on collateral. We use unique surveys of MSMEs from Bulgaria, Georgia, Russia and Ukraine. We find that MSMEs receiving a cash flow or collateral loan in the past are more likely to receive the same type of loan (and larger sized) in the future and that cash flow loans may be the preferred form of credit. Both types of loans are related positively to most performance indicators, enabling the MSMEs for instance to be more profitable and expand production. The cash flow loans also appear to be particularly attractive credit delivery schemes for micro and small enterprises. Finally, the effects of the smallest loans are often negative, suggesting that the minimum loan size is an important policy issue.

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1. Introduction

Due to the important contribution that entrepreneurs and micro, small and medium-sized enterprises (MSMEs) make to economic growth, innovation and employment creation, researchers and policymakers emphasize the need for a better understanding of the factors influencing the rise and performance of these firms. Academic research has identified limitations to the availability of finance for MSMEs constraining firms' performance, such as informational asymmetries between borrowers and lenders, lack of credit history on the part of many MSMEs, poor legal and institutional infrastructure, scarcity of appropriate credit skills in banks and economies of scale in lending. In this article, we analyse the effects of the provision of two types of bank credit to MSMEs in transition economies on firm performance – a new type of loan based on cash flow and traditional-style loans based on collateral (fixed assets and movable assets such as cars).

Before the 2001–2004 period covered by our study, standard bank credit to MSMEs in the transition economies was very limited, with microenterprises obtaining virtually no credit. The few firms that benefited from bank credit had to provide large amounts of collateral and sometimes had to use a series of short-term loans to finance longer-term capital investments.[2] In most cases, the type of collateral accepted by financial institutions was not available to MSMEs. There was hence an important gap in the financial market.[3]

To overcome the problem of a lack of collateral on the part of MSMEs, governments, international financial institutions and non-governmental organizations (NGOs) established new programmes to support the delivery of (cash flow based) credit to MSMEs. The rationale was to support the creation of sustainable and commercially viable microfinance channels. These programmes focused on reducing lending costs, lowering banks' perceptions of risk associated with MSME borrowers, improving banks' screening methodology and helping these borrowers build a credit history. The ultimate objective was the easing of credit constraints of MSMEs.

Interestingly, while the objectives of MSME lending programmes are widely accepted as being important, little evidence is available regarding their impact (see Brown *et al.*, 2002; Hulme and Mosley, 1996; Morduch, 1999). Most evaluations have been monitoring exercises relying on the perceptions of the beneficiaries of the programmes. Those evaluations do not satisfactorily address the issue of selection bias, that is, the problem that the observed performance of the beneficiaries may not be attributable solely to the programme, but also to predetermined characteristics of the firms that allowed them to be selected into the programmes. Since inherently

[2] Using survey data from Kosovo, Krasniqi (2010) evaluates the determinants of small firms receiving a loan. He shows that collateral is the main indicator on the basis of which banks make their lending decisions.

[3] See for instance Pissarides, Singer and Svejnar (2003) for an analysis of the objectives and constraints of entrepreneurs in transition economies.

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better performing MSMEs are more likely to be selected into the programmes, the impact of programmes is normally over-estimated.[4]

More recent evaluations strive to eliminate the selection bias by using statistical techniques such as difference-in-differences, difference-in-differences-in-differences and instrumental variables (IVs).[5] In some cases, researchers have used other quasi-experimental techniques,[6] such as trying to assess the impact of microfinance programmes by comparing the impact on repeat clients of a microfinance programme to that on new clients, where new clients are the control group and repeat clients constitute the treatment group.[7] This methodology has potentially serious shortcomings, however, in that it omits dropouts from the analysis (see, for example, discussion in Karlan, 2001).[8] Alternatively, Coleman (1999) utilized pipeline matching, whereby borrowers' performance is compared to that of clients who sign up to participate in a future lending programme and thus undergo the same selection as current borrowers. Although appealing, this methodology may yield a biased estimate of the true impact in the presence of the Ashenfelter dip effect (in other words, the pre-programme performance of the control group may be affected by the expectation of being in the programme).[9] Bah *et al.* (2011) evaluate the effect of technical and financial aid in Macedonia. They use matching techniques to address the selection bias and find that the assistance improves firms' employment growth.

In this article, we are fortunate to have obtained access to client data from banks participating in microfinance programmes of the European Bank for Reconstruction and Development (the EBRD) for an *ex post* analysis.[10] The EBRD is among the key institutions introducing and supporting the commercially based credit

[4] See, for example, Mosley (1998).

[5] See, for example, Banerjee and Duflo (2004); LeLarge *et al.* (2008); Storey (2000). These studies control for the effect of observed variables that affect the outcome and may be correlated with participation in the programme by including these variables as regressors in the estimation equation predicting the outcome, matching beneficiaries and non-beneficiaries that are similar in observed characteristics, or modelling how selection into a programme occurs and how it is correlated with unobserved variables. Other analytical evaluations use randomly selected groups of beneficiaries and non-beneficiaries. Giné *et al.* (2006) for instance discuss a recently launched randomized impact evaluation of a microfinance programme in the Philippines.

[6] Karlan and Goldberg (2006) provide a useful survey of studies examining the impact of microfinance programmes, products and policies carried out with the randomized trials methodology and quasi-experimental designs.

[7] This approach has been used in impact evaluations funded by USAID through its AIMS project.

[8] Alexander-Tedeschi and Karlan (2009) for instance find that by including dropouts in the analysis the estimated impact of microfinance is greatly reduced. They compare the different results of the impact evaluation of a microfinance programme in Peru with and without dropouts in the sample. The analysis excluding dropouts found a positive impact of credit on profits, household income and firm employment. The analysis including dropouts found a negative impact of credit on firm profits, and a reduced positive impact on household income and firm employment.

[9] Coleman (1999) found no impact of credit on the performance of clients and prospective clients of a microfinance programme in Thailand.

[10] At the time, a randomized *ex ante* evaluation approach was not feasible because the financial intermediaries perceived the cost of randomized provision of credit to be too high relative to the potential benefits.

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programmes targeting MSMEs in the Eastern European region. The EBRD introduced cash flow-based lending that uses a more flexible definition of collateral, therefore reaching out to a larger number of firms. The EBRD programme provided financial incentives to banks (in the form of credit lines granted at a discounted rate) to use this new cash flow-based approach in lending to small borrowers and it also aimed at building credit skills for MSME lending in existing commercial banks and newly established specialized banks known as microfinance banks.

To carry out our analysis, we administered a survey in 2005 to a sample of (a) MSMEs that had received a loan from one of eight EBRD-sponsored MSME lending projects in 2002, and (b) similar MSMEs that had never received an EBRD project loan. The latter sample represents our control group. In both groups, some firms had received loans from non-EBRD sources during our sample period and some had not. In the survey, we have data on performance indicators and all loans (both cash flow and collateral loans) that the firms obtained during 2001–2004.

There are two key questions that we address. First, what factors determine whether MSMEs receive collateral loans or cash flow loans? Second, what is the effect of the cash flow vs. collateral credit on MSME performance? We use several indicators of firm performance: capital (fixed assets) formation, revenues, employment and profit.[11] We conduct our analyses on all firms taken together, as well as on specific size groups: micro, small and medium-sized enterprises, defined as firms with 1–5 employees (including the self-employed and working family members), 6–15 employees and 16 or more employees, respectively.

We find that firms that received a given (cash flow or collateral) loan in the past are more likely to receive the same type of loan, and also a larger loan of the same type, in the future. Having received a cash flow loan in the past has a negative effect on the probability of receiving a collateral loan in the future, while the corresponding negative cross-effect from receiving collateral loans in the past on the probability of receiving a cash flow loan is statistically insignificant for micro and small firms. Estimates based on the entire sample suggest that both the cash flow and collateral loans have a positive relationship with fixed asset formation, suggesting that firms use bank loans for investment in fixed capital. In terms of dollars of fixed assets generated by a dollar of loan, the effects of the two types of loans are similar. The positive effect of both types of loans is by and large also found with respect to revenues, and employment. In particular, the overall estimates for all firms indicate that the loans serve the purpose of enabling the MSMEs to expand production beyond the scale that they could have achieved without this source of credit. In the overall sample, the two types of loans are also found to have a positive effect on profitability. We find that the above pattern holds across the size groups of firms, but some estimated effects (especially those for micro firms and to a lesser extent medium-sized firms) are statistically

[11] Berger and Udell's (2006) work highlights the fact that programmes providing credit through different lending methodologies are likely to yield different outcomes and should not be treated as a homogeneous set of providers.

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less significant. Finally, our estimates suggest that while most cash flow and collateral loans have a positive effect on the growth of fixed assets, revenues, employment and net profit, in many cases the effects of the smallest loans are negative.

The article is organized as follows. Section 2 describes the MSME financing projects whose impact we evaluate, while Section 3 discusses the main features of the survey and basic statistics. Section 4 outlines the analytical framework, Section 5 presents the empirical results and Section 6 contains the conclusions. Appendix 1 provides descriptive statistics on the treatment and control firms across size groups, while Appendix 2 presents information on the banks that provided cash flow credit.

2. Objectives and structure of the evaluated MSME projects

The EBRD financing projects are structured as loans to banks and other financial institutions that use the EBRD loans to extend loans to MSME borrowers. The EBRD couples these loans to banks with a technical assistance programme through which the banks acquire new lending methodologies that are appropriate for dealing with a large number of small borrowers in an environment with underdeveloped institutional and financial infrastructure. The EBRD projects result in individual MSME loans that are extended on the basis of risk considerations and borrowers' ability to repay the loan (measured as a percentage of their cash flow projections).[12] Banks not participating in the EBRD programmes have instead been extending loans to small borrowers using a traditional collateral lending methodology. The cash flow approach allows local banks to extend a large number of loans and in a short loan-processing time. From Table 1, we see that the number of days to receive a loan is statistically significantly lower for cash flow loans than for collateral loans. The short processing time in turn permits MSMEs to access credit when they need it. The EBRD programmes provide no subsidy to the MSMEs. The effective interest rates charged by the EBRD programmes are on average in line with the market rates charged by other banks. From Table 1, we can see that cash flow loans in fact charge slightly higher interest rates. In terms of collateral requirements, however, the banks in the EBRD programmes accept as collateral almost anything that 'matters to the borrower' to provide the borrower with an incentive to repay the loan, but not to protect itself in case of default. The use of collateral in these loans is in fact purely for incentive purposes because the net revenue that the bank might obtain from the sale of such flexible collateral would be negligible but the potential loss to the borrower would often exceed the value of the loan. From Table 1, we see that the mean percentage of loan provided as collateral was similar for the two types of loans in 2001, while in 2004 the treatment firms were pledging a higher share of collateral for both types of loans compared with control firms.

The EBRD operates through *de novo* dedicated microfinance banks as well as existing local commercial banks. The microfinance banks are set up by both private

[12] The main variable of interest is the leverage ratio of the borrower.

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Table 1. Loan statistics

	Control group			Treatment group					
	Collateral loans	Collateral loans	Cash flow loans	Difference between 1 and 2	*T*-test	Difference between 2 and 3	*T*-test	Difference between 1 and 3	*T* -test
	1	2	3	4	5	6	7	8	9
2001									
Mean loan size (in USDs)	58,039.10 (99,086.7)	11,002.60 (12,201.39)	13,737.59 (28,317.67)	47,036.50	3.25 ***	−2,734.99	−0.99	44,301.51	3.07***
Mean loan maturity (in months)	15.31 (11.31)	20.03 (16.59)	12.73 (4.21)	−4.72	−1.44	7.30	2.55**	2.58	1.56
Mean loan interest rate (in %)	19.23 (5.54)	17.67 (6.23)	20.97 (7.08)	1.56	1.17	−3.30	−2.85***	−1.74	−1.9*
Mean percentage of loan provided as collateral	177.71 (116.79)	176.03 (96.48)	218.85 (502.92)	1.68	0.07	−42.82	−1.20	−41.14	−1.15
Mean number of working days taken to obtain the loan	20.96 (24.67)	25.12 (19.94)	13.99 (16.46)	−4.16	−0.84	11.13	3.11***	6.97	1.89*

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Table 1. (Continued)

	Control group			Treatment group					
	Collateral loans	Collateral loans	Cash flow loans	Difference between 1 and 2	*T*-test	Difference between 2 and 3	*T*-test	Difference between 1 and 3	*T* -test
	1	2	3	4	5	6	7	8	9
Number of loans	48	34	252						
2004									
Mean loan size (in USDs)	40,997.91 (87,531.86)	35,079.05 (60,220.4)	22,185.65 (46,006.73)	5,918.86	0.48	12,893.40	1.47	18,812.25	2.04**
Mean loan maturity (in months)	21.58 (21.19)	27.27 (24.28)	19.07 (13.04)	−5.69	−1.40	8.20	2.35**	2.51	1.11
Mean loan interest rate (in %)	17.11 (5.76)	16.25 (4.72)	18.27 (6.68)	0.86	0.96	−2.02	−2.76***	−1.17	−1.76*
Mean percentage of loan provided as collateral	137.52 (70.34)	179.50 (98.97)	165.34 (118.46)	−41.98	−2.67***	14.16	0.94	−27.83	−3.09***
Mean number of working days taken to obtain the loan	16.09 (17.77)	17.08 (19.78)	9.39 (10.62)	−0.99	−0.30	7.69	2.71***	6.70	3.55***

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Table 1. (Continued)

	Control group			Treatment group					
	Collateral loans	Collateral loans	Cash flow loans	Difference between 1 and 2	*T*-test	Difference between 2 and 3	*T*-test	Difference between 1 and 3	*T* -test
	1	2	3	4	5	6	7	8	9
Number of loans	95	50	481						

***Notes*:** Treatment group consists of MSMEs that had received a loan from one of eight EBRD-sponsored MSME lending projects in 2002. Control group consists of MSMEs that had never received an EBRD project loan. Loan size is adjusted to producer prices. For all countries the country specific producer price index is used except for Russia for which the Nizhny Novgorod regional producer price index is used. Standard deviations are given in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

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and public shareholders. The rationale for establishing them has been to create a reliable, permanent delivery mechanism for MSME finance. Normally, 90 percent of the microfinance banks' loans have to be below a US$ 10,000 threshold, with the remaining 10 percent going up to about US$ 200,000. Because of the high fixed costs of extending and monitoring loans, the larger loans account for a larger share of profits. However, the average size of the loans of these banks is kept well below the US$ 10,000 threshold.

The local banks, attracted by the profitability of the cash flow-based lending financed through the EBRD loans, have gradually started utilizing their own funds to provide cash flow loans. The assignment of clients of local banks to the cash flow programme is carried out at the branch level. As loan officers get trained in the cash flow methodology in a bank branch, all clients requesting very small loans are allocated to the cash flow programme. There is also no possibility of shifting specific clients from one bank branch to another as MSMEs are allocated to branches according to their geographical proximity to the branch. There is hence generally no incentive to allocate good quality clients to either the collateral or cash flow lending.[13]

The beneficiaries of cash flow programmes are private entrepreneurs and firms, ranging from self-employed one-person businesses to companies with up to 100 employees. Loans start as low as US$ 20 (for example, for an open bakery on a Central Asian market to buy flour) up to about US$ 200,000 (for example, for the purchase of upholstery equipment for a furniture producer in Ukraine).

3. The survey, sample and basic statistics

During the first half of 2005, we administered a questionnaire to a sample of 1,272 MSMEs (defined as firms with fewer than 250 employees) in Bulgaria, Georgia, Russia and Ukraine.[14] In each country, these MSMEs represent a stratified random

[13] In one of the eight programmes, there was however a potential incentive for a bank to allocate loan applicants non-randomly between the cash flow and collateral loans. In the case of Hebros Bank in Bulgaria, there may have been an incentive to shift the best clients from the collateral to the cash flow portfolio of loans because Hebros Bank received a credit line from EU/EBRD SME Facility to provide loans to MSMEs. EBRD offered a discount on the interest charged on this credit line. We have therefore checked whether the estimates based on data from Hebros Bank differed from others and found that the Hebros and other estimates were not statistically different from one another.

[14] The selection of countries in which the survey was run was based on a number of criteria: First, the number of loans extended by each financial intermediary in the EBRD programme being at least 250; second, to allow for a comparison of the impact on MSMEs of the different quality of finance provided by different types of financial intermediaries, the presence of both dedicated microfinance institution and existing local banks administering targeted credit lines; finally, in the case of large countries, an overlap of selected regions with regions in which the 2002 BEEPS was run, as the firms in the control group were selected from the BEEPS sample. (BEEPS is a survey of over 9,500 companies in 26 transition countries and Turkey. See European Bank for Reconstruction and Development (2005) for details.

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sample of manufacturing, trade and other service sector enterprises that in 2002 received finance from the EBRD's MSME financial intermediaries (the treatment group that represents roughly two thirds of the overall sample per country) and enterprises that by the time of the survey had not received finance from the EBRD intermediaries, but were in existence in 2002 (the control group comprising about one third of the overall sample per country). The treatment group firms were selected as a random sample stratified by employment size and sector.[15] The control group comprises firms that are matched to the treatment group by location, employment size and sector.

Although no quotas were applied to specific sectors, in practice most interviewed enterprises are in the (broadly defined) trade sector because a majority of companies that borrowed from the banks in question are in this sector. Microenterprises constitute the bulk of the loan portfolio. In the case of microfinance institutions and micro-lending programmes through participating banks, microenterprises account on average for two thirds of the volume and 90 percent of the number of loans.[16] As the role of microenterprises in financial intermediaries' portfolios is so large, this is reflected in the size of sample strata by size class.[17] Since we wanted to analyse the impact of cash flow vs. collateral finance on enterprises of all sizes, we aimed at having all size classes represented in the sample. Yet, due to total sample size limitations, in some cases the sample stratification does not match exactly the financial intermediaries' portfolio composition, although it does reflect the dominance of micro firms in the banks' portfolio by giving a larger weight to microenterprises (54 percent of total number of surveyed enterprises) than to small (36 percent) or medium-sized enterprises (10 percent).

Table 2 shows the sample composition by size class and sector for both control and treatment groups. The control group firms were selected in 2005 as a stratified random sample from marketing lists, internet databases, yellow pages and interviewers' walk-ins to match the treatment group in each country by categories of location, employment size and sector.[18]

[15] Except for Ukraine it was not possible to find sufficient enterprises in the largest employment category as most of the banks working for the EBRD did not extend a sufficient number of loans to this category of enterprises. Also in the case of TUB in Georgia, it was impossible to interview the specified quota of 100 enterprises per each bank due to the small number of loans extended by this bank in 2002 combined with business failures and inability to reach the enterprises which benefited from TUB loans. This failure was compensated by adding more enterprises from the Procredit Bank in Georgia. In Bulgaria, the Hebros Bank and Procredit Bank had several inaccurate contact entries and the sample was hence drawn with replacement.

[16] In the case of Hebros Bank, these data are unknown as monitoring of the use of the proceeds of the Facility is based on its subloans' size rather than on its subborrowers' size.

[17] Quotas were specified for the size composition of the sample of enterprises to be interviewed (50 percent of the sample had to employ up to 9 employees, 20 percent between 10 and 24 employees, 15 percent between 25 and 49 employees, and 15 percent between 50 and 249 employees).

[18] The matching was not on a one-to-one basis, but by categories of location, size and sector. All firms from Georgia and Russia came from one location – Tbilisi and Nizhniy Novgorod, respectively.

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Table 2. Number of firms by employment and sector in 2004

	Number of employees			Sector			
	1–5	6–15	16–249	Trade	Industry	Service	Total
Bulgaria							
Treatment group	47	73	80	97	68	35	200
Control group	25	42	53	34	41	45	120
Total	72	115	133	131	109	80	320
Georgia							
Treatment group	115	58	31	139	34	31	204
Control group	54	32	27	54	34	25	113
Total	169	91	58	193	68	56	317
Russia							
Treatment group	49	85	86	142	28	50	220
Control group	38	42	35	75	25	15	115
Total	87	127	121	217	53	65	335
Ukraine							
Treatment group	68	56	76	103	80	17	200
Control group	23	35	42	49	41	10	100
Total	91	91	118	152	121	27	300
All countries							
Treatment group	279	272	273	481	210	133	824
Control group	140	151	157	212	141	95	448
Total	419	423	430	693	351	228	1,272

***Notes*:** Treatment group consists of MSMEs that had received a loan from one of eight EBRD-sponsored MSME lending projects in 2002. Control group consists of MSMEs that had never received an EBRD project loan.

The summary statistics of the key variables used in our analysis are provided in Table 3. All variables have reasonable values and display considerable variation over time. Given that the matching of the control group to the treatment group was structured around location, employment size and sector of the firms, other variables show a larger variation. The summary statistics across size groups are presented in Appendix 1. The number of loans is evenly distributed across size classes for cash flow loans while more loans are granted to larger companies in the case of collateral loans. This is consistent with the notion that the traditional banking approach prefers to issue loans to bigger rather than smaller businesses. From Table 1, we can see that collateral loans have a larger average loan size than cash flow loans in 2004, also collateral loans received by control firms in 2001 were larger than loans received by treatment firms.

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Table 3. Summary statistics

	Control group			Treatment group		
	Mean	Median	SD	Mean	Median	SD
2001						
Revenue	430	65	2,674	193	61	522
Investment	14	0	64	12	2	48
Fixed assets	117	9	759	55	9	207
Net profit	44	7	146	54	10	286
Total employment	18	7	35	12	5	26
Leverage	7	0	16	7	0	15
Number of firms with independent auditors	87			90		
Number of firms	401			779		
2004						
Revenue	549	69	2,466	335	77	1,389
Investment	26	1	125	24	3	89
Fixed assets	125	11	538	87	14	308
Net profit	64	8	234	114	13	1,160
Total employment	19	8	33	19	8	34
Leverage	8	0	17	14	4	21
Number of firms with independent auditors	148			123		
Number of firms	448			824		

***Notes*:** Treatment group consists of MSMEs that had received a loan from one of eight EBRD-sponsored MSME lending projects in 2002. Control group consists of MSMEs that had never received an EBRD project loan. Financial data are expressed in thousands of US dollars. Figures are adjusted to producer prices. For all countries the country specific producer price index is used except for Russia for which the Nizhny Novgorod regional producer price index is used. Total employment is a full time equivalent of full-time, part-time and temporary employees. Leverage is defined as ratio of debt to debt plus equity.

Given our survey design, we do not observe any exit of firms. We do know the failure rate among the firms that received EBRD credit in 2002. The failure rate from 2002 to 2005 was less than 10 percent for firms in Bulgaria, Russia and Ukraine, and it was slightly above 10 percent for firms in Georgia. For our comparison group of firms, we do not have the failure statistics and we therefore cannot compare directly the survival rates of the treatment and the control group of firms. However, to carry out this type of comparison, we selected another control group for this purpose, namely the enterprises that were surveyed by BEEPS survey in the 2002 and 2005 waves. We can get the average attrition rates by country, which are around 15 percent, except for Georgia where the exit rate is 25 percent. In the BEEPS survey, we can also split the firms into those that received credit and those that did not. Interestingly, we observe almost no failure among the credit-receiving Bulgarian and

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Russian firms, while the failure rate among the credit receivers in Georgia and Ukraine is higher than the average (around 35 percent). Using the BEEPS sample as a control group has a significant drawback, however, in that we are not able to exclude the possibility that some of the loan recipients within the BEEPS group were clients of the EBRD funded programmes for financing MSMEs. Overall, it seems that treatment firms are less prone to failure. Hence, our sampled firms may be better performers than the average firm in a country (this distinction is even more pronounced with respect to the control group of the firms since their failure rates were higher).

4. Analytical framework

In carrying out our analysis, we need to take into account the fact that our sampled firms differ as to whether they received a cash flow loan in 2002 and also whether and when they received other loans. In particular, firms in the treatment group may have received other cash flow or collateral loans before and after 2002, while firms in the control group may have received collateral loans at any time. From an analytical standpoint there may hence be a selection problem, with better performing firms for instance being more able to obtain cash flow and/or collateral loans. If one did not control for this non-random assignment of firms to loans, one could mistakenly attribute the superior post-2002 performance to loans rather than recognizing that part may be due to inherently superior performance of the firms that receive loans. In view of the design of our sample, we are able to control for the treatment and performance of different firms up to 2002, and then focus on analysing the impact of subsequent cash flow and collateral loans on performance.

4.1 Determinants of receiving a loan

The probability that a firm receives a cash flow or collateral loan, respectively, is predicted by two dummy variables indicating whether the firm received a cash flow or collateral loan 2 years earlier, a dummy variable reflecting whether the firm had an independent auditor 2 years before a loan was granted, and a continuous variable reflecting the firm's initial leverage in 2001:[19]

$$CF_{it} = \alpha + \beta CF_{it-2} + \gamma CL_{it-2} + \delta Auditor_{it-2} + \phi Leverage_{i2001} + \varepsilon_{it}, \quad (1)$$

$$CL_{it} = \alpha + \beta CF_{it-2} + \gamma CL_{it-2} + \delta Auditor_{it-2} + \phi Leverage_{i2001} + \varepsilon_{it}, \quad (2)$$

where CF_{it} (CL_{it}) is a dummy variable which assumes value 1 if a cash flow (collateral) loan is awarded to firm i in year t and 0 in all other cases, *Auditor* is a dummy variable

[19] Using dummy variables for the initial (2000 or 2001) loan status instead of the 2-year lagged loan status yields similar results.

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equal to 1 if firms had an independent auditor, *Leverage* is a ratio of debt to debt plus equity and ε_{it} is an error term. We also control for country effects, industry effects and time effects. We apply a logit estimation procedure to evaluate Equations (1) and (2).

In alternative specifications, we use the amount of loan received as a dependent variable and we use the same set of determinants to predict the size of loan received. We apply a Tobit estimation procedure.

4.2 *The effects of loans on performance*

Formally, in the spirit of Ashenfelter and Card (1985), Heckman and Hotz (1989), and Hanousek *et al.* (2007), we specify a panel-data procedure. Let X_{it} be a given performance indicator, with subscript i denoting an individual firm and t denoting year (t goes from 2001 to 2004). A simple model of performance may be specified in the form of an annual rate of change (first-difference of logs) of the dependent variable as

$$\Delta \ln X_{it} = \alpha + \beta \ln X_{i2001} + \gamma CF_{it-1} + \delta CL_{it-1} + \varepsilon_{it}, \quad (3)$$

where ε_{it} is the error term. Our interest is in estimating the γ of cash flow loans and δ of collateral loans obtained in the 2002–2004 period. In empirical estimations of Equation (3), we also control for country effects, industry effects and time effects. Note that Equation (3) is relatively flexible and that it takes firms that received no loans as the base, permitting their percentage change in performance to vary over time at the rate $\alpha + \beta \ln X_{i2001}$. In addition, Equation (3) controls for the effects on performance of any fixed differences among all firms.[20] A particular concern is that we should ensure that our estimates capture the effect of loans rather than other factors such as competition. As may be seen from Equation (3), we do so by controlling for these other factors by the initial (2001) performance and by including the aforementioned country, industry and time effects. Finally, we also allow for two specifications of the effect of the two types of credit: one where the effect does not vary with the amount of credit and one where the effect of credit varies with loan size.

There are three key econometric issues that we need to account for in our analysis: omitted variables bias, measurement error, and endogeneity/selection of receiving loans. We address omitted variables bias by including a number of important control variables described above. With respect to measurement error in loans, performance and other variables, we note that the error can induce attenuation bias as well as more complicated biases in estimated coefficients. Being aware of this problem, in collecting the dataset we placed particular emphasis on identifying precisely

[20] Note that we have also estimated the effects of loans on the level (as opposed to the rate of change) of performance and found these effects to be statistically insignificant and their exclusion not to materially affect the other parameter estimates.

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individual loans, as well as carefully collecting several indicators of performance for the current and preceding periods. In this respect, our survey is of higher quality than many other surveys in this area. Our emphasis on collecting high quality information is also reflected in the relatively high response rate (38 percent) that we have generated from firms for our questionnaires. Finally, we also checked that there are no outliers that would seriously affect our estimates.

As to endogeneity/selection of receiving loans, there is a danger that the inherently superior performance of the firms selected for receiving cash flow or collateral loans could be attributed to loans rather than the possibly non-random assignment of firms to loans. We address this problem as follows. First, we match the control group firms with the treatment group on the three observable characteristics discussed above. Second, we use the panel data specification in Equation (3) with the aforementioned covariates as controls. This controls for the possibility that firms are not assigned to loans at random and that lending institutions may give loans to firms that are inherently superior or inferior performers. In addition, our survey includes questions with regard to business constraints. One of the constraints that firms were asked about was the availability of financing from banks. The response to this question was statistically indifferent for treatment and control group firms. This allows us to assume that fewer loans in the control group were the firms' choice. Also, the treatment firms considered the cost of financing as a more severe constraint than did the control firms. This again suggests that control firms were not treated worse than the treated firms with respect to firm financing.

5. The empirical results

We present our empirical estimates in three parts. First, we discuss the results related to the determinants of the probability that a firm receives a cash flow or collateral loan. Second, we examine the effects of the presence of cash flow and collateral loans on MSME performance, irrespective of the size of these loans. We carry out this estimation for all firms together and separately by firm size, using the three size categories of firms corresponding to micro, small and medium-sized firms.[21] Finally, we examine the extent to which the effects of loans vary by loan size.

In Panel A of Table 4, we report marginal effects of a logit estimation relating the probability of receiving a cash flow or collateral loan in a given year to the explanatory variables in Equations (1) and (2). In Panel B, we report Tobit estimates related to the size of the loan as the dependent variable. In all tables, we first present

[21] The firms are split into size classes based on employment in year 2002. Our data show that allowing all the regression coefficients to be different (i.e. running separate regressions) in the three size categories of firms is statistically superior to constraining all coefficients to be the same and allowing only the loan effect to vary by firm size (i.e. by interacting loan with size). We therefore run separate regressions. The two approaches yield similar results.

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Table 4. Panel A – determinants of receiving a loan (marginal effects from logit estimations); Panel B – determinants of a loan size received (Tobit estimations)

Panel A

	All firms		Micro firms		Small firms		Medium firms	
	Cash flow loan	Collateral loan	Cash flow loan	Collateral loan	Cash flow loan	Collateral loan	Cash flow loan	Collateral loan
Cash flow loan	0.486	−0.031	0.507	−0.031	0.458	−0.019	0.474	−0.062
($t-2$)	(0.020)***	(0.007)***	(0.034)***	(0.008)***	(0.035)***	(0.012)*	(0.041)***	(0.021)***
Collateral loan	−0.114	0.325	−0.051	0.155	0.017	0.265	−0.208	0.454
($t-2$)	(0.040)***	(0.037)***	(0.111)	(0.068)**	(0.074)	(0.069)***	(0.051)***	(0.055)***
An independent	−0.146	0.033	−0.004	0.011	−0.147	0.038	−0.202	0.011
auditor ($t-2$)	(0.025)***	(0.012)***	(0.058)	(0.017)	(0.048)***	(0.023)	(0.039)***	(0.023)
Leverage in 2001	0.050	0.059	0.093	0.056	0.150	0.004	−0.062	0.132
	(0.060)	(0.018)***	(0.122)	(0.022)**	(0.096)	(0.035)	(0.107)	(0.046)***
Observations	3,783	3,783	1,413	1,329	1,317	1,293	1,053	1,017
Pseudo R^2	0.16	0.21	0.15	0.12	0.16	0.14	0.21	0.28
F-statistic	423.26	309.14	134.81	44.08	139.04	56.84	138.39	152.01

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Panel B

	All firms		Micro firms		Small firms		Medium firms	
	Cash flow loan	Collateral loan	Cash flow loan	Collateral loan	Cash flow loan	Collateral loan	Cash flow loan	Collateral loan
Cash flow loan	8.326	−5.144	8.006	−9.583	7.485	−3.709	8.529	−4.825
($t-2$)	(0.386)***	(1.278)***	(0.616)***	(3.223)***	(0.623)***	(2.299)	(0.790)***	(1.821)***
Collateral loan	−2.102	18.551	−1.065	16.242	0.536	18.392	−4.838	16.249
($t-2$)	(0.713)***	(1.554)***	(1.482)	(4.557)***	(1.172)	(3.457)***	(1.228)***	(1.732)***
An independent	−2.188	4.521	−0.103	1.891	−2.049	6.366	−4.002	1.153
auditor ($t-2$)	(0.452)***	(1.234)***	(0.905)	(3.788)	(0.777)***	(2.771)**	(0.828)***	(1.476)
Leverage in 2001	0.852	7.656	1.355	13.247	2.169	−0.175	−1.146	7.324
	(0.951)	(2.685)***	(1.773)	(7.365)*	(1.459)	(5.559)	(1.840)	(3.176)**
Observations	3,783	3,783	1,413	1,413	1,317	1,317	1,053	1,053
Pseudo R^2	0.05	0.10	0.05	0.08	0.05	0.08	0.07	0.13
F-statistic	136.46	50.34	45.75	6.56	41.36	9.25	44.43	29.77

***Notes*:** Dependent variables are cash flow (collateral) loan dummy which equals 1 if firm received cash flow (collateral) loan in a given year (Panel A), and cash flow (collateral) loan dummy interacted with the log loan size (in US dollars) (Panel B). An independent auditor is a dummy variable, which equals 1 if firm had the independent auditor at least 2 years before receiving a loan. Leverage is a ratio of debt over the sum of debt and equity. All regressions include industry, country and year dummies. Micro firms have 1–5, small firms have 6–15 and medium-sized firms have 16 or more employees. Robust standard errors (Panel A) and standard errors (Panel B) are given in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

estimates for all firms taken together and then separate estimates for each of the three firm size categories.[22]

As may be seen from Table 4, the 2-year lagged loan variables have a strong explanatory power, indicating that firms that received a given (cash flow or collateral) loan in the past are more likely to receive the same type of loan, and also a larger size loan of the same type, in the future. The effect of having received a cash flow loan in the past has a negative effect on receiving a collateral loan in the future, however, and this effect is significant for all firm size categories. The same negative cross-effect is seen for past collateral loans on current cash flow loans for the sample as a whole and for medium-sized firms, but it is insignificant for micro and small firms. We discuss the implication of these findings below.

The presence of an independent auditor increases the probability that firms receive collateral loans and it also has a positive effect on the size of collateral loans, although this positive effect is statistically insignificant in some of the subsamples. On the other hand, the presence of an independent auditor reduces the probability that firms receive a cash flow loan and the size of this type of a loan, with this negative effect also not being statistically significant in some of the subsamples. Overall, it appears that banks that rely on the collateral method of assessing creditworthiness view favourably the presence of independent auditors, while banks relying on the cash flow method tend to ignore or even discount the presence of independent auditors.[23] Leverage in 2001 has a positive effect on the probability of firms getting a collateral loan and on collateral loan size. On the whole, the explanatory variables have a strong explanatory power in both sets of regressions. The pseudo R^2s are in the 0.12–0.28 and 0.07–0.13 range, respectively.

The effects of loans on performance are presented in Tables 5–8. In each table, we first give estimates from a model in which the performance effects of loans do not vary with loan size and subsequently estimates from a model where the effect of credit varies with loan size.

In Table 5, we report the effects of cash flow and collateral loans on the rate of growth of fixed assets. In the first column of the table, the estimated average effects of a loan, based on data for all firms, suggest that the award of a cash flow loan (collateral loan) is related to a 10.7 (15.7) percentage point higher growth rate of fixed assets of the firm. Since the collateral loans are on average three times as large as the cash flow loans, the percentage effect per dollar of loan may be argued to be about twice as high for the cash flow loans than collateral loans.[24] However, since firms receiving collateral loans are on average about twice as large as firms receiving cash

[22] Note that these size categories give us a similar number of observations for each group and hence provide a useful stratification for drawing inferences about the probability of obtaining a loan and the effects of loans in micro, small and medium-sized enterprises.

[23] Alternatively, it could be that firms with an independent auditor tend to be firms with good collateral and hence have lesser need for cash flow loans. We thank the Editor for pointing this out.

[24] The intuition here is that the 15.7 percentage effect would become one third (5.23 percentage effect) if the size of the collateral loan were just one third of its size.

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Table 5. Loan effects on fixed assets

	Firms							
	All	Micro	Small	Medium	All	Micro	Small	Medium
Cash flow loan	0.107	0.052	0.106	0.174	−0.736	−0.481	−0.507	−1.238
	(0.019)***	(0.026)**	(0.026)***	(0.042)***	(0.161)***	(0.143)***	(0.167)***	(0.489)**
Collateral loan	0.157	0.203	0.114	0.163	−0.383	−0.586	−0.656	−0.511
	(0.032)***	(0.091)**	(0.046)**	(0.047)***	(0.165)**	(0.466)	(0.351)*	(0.327)
Log fixed assets in 2001	−0.036	−0.032	−0.060	−0.065	−0.053	−0.042	−0.068	−0.084
	(0.006)***	(0.011)***	(0.010)***	(0.021)***	(0.008)***	(0.013)***	(0.010)***	(0.027)***
Cash flow loan × log loan size					0.095	0.066	0.069	0.141
					(0.019)***	(0.019)***	(0.018)***	(0.052)***
Collateral loan × log loan size					0.057	0.094	0.082	0.065
					(0.017)***	(0.062)	(0.037)**	(0.032)**
Critical log cash flow loan size					7.752	7.246	7.387	8.789
					(0.201)***	(0.368)***	(0.586)***	(0.330)***
Corresponding percentile from the loan size distribution					21	25	9	21
Critical log collateral loan size					6.689	6.22	8.023	7.807
					(0.992)**	(1.125)***	(0.806)***	(1.365)**
Corresponding percentile from the loan size distribution					3	12	6	5
Observations	3,605	1,305	1,270	1,030	3,605	1,305	1,270	1,030
R^2	0.08	0.08	0.17	0.08	0.11	0.09	0.19	0.11

Notes: Dependent variable is defined $\ln(Xt)-\ln(Xt-1)$. Cash flow (collateral) loan dummy equals 1 if firm received credit based on cash flow (collateral) method in a given year. The critical log cash flow (collateral) loan size is calculated by dividing the coefficient of cash flow (collateral) loan by the coefficient of cash flow (collateral) loan × log loan size. All regressions include industry, country and year dummies. Micro firms have 1–5, small firms have 6–15, and medium-sized firms have 16 or more employees. Robust standard errors in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

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Table 6. Loan effects on revenues

	Firms							
	All	Micro	Small	Medium	All	Micro	Small	Medium
Cash flow loan	0.045	0.047	0.040	0.053	−0.333	−0.358	−0.133	−0.442
	(0.012)***	(0.018)**	(0.019)**	(0.026)**	(0.061)***	(0.114)***	(0.123)	(0.128)***
Collateral loan	0.083	0.175	0.067	0.030	−0.147	0.249	−0.598	−0.415
	(0.022)***	(0.059)***	(0.030)**	(0.035)	(0.135)	(0.272)	(0.228)***	(0.206)**
Log revenue in 2001	−0.027	−0.043	−0.054	−0.015	−0.035	−0.048	−0.058	−0.025
	(0.004)***	(0.008)***	(0.009)***	(0.010)	(0.004)***	(0.008)***	(0.008)***	(0.010)**
Cash flow loan × log loan size					0.043	0.05	0.019	0.049
					(0.007)***	(0.014)***	(0.014)	(0.013)***
Collateral loan × log loan size					0.024	−0.009	0.070	0.043
					(0.014)*	(0.033)	(0.024)***	(0.020)**
Critical log cash flow loan size					7.809	7.113	6.874	8.956
					(0.303)***	(0.425)***	(1.689)***	(0.545)***
Corresponding percentile from the loan size distribution					23	19	3	25
Critical log collateral loan size					6.016	28.533	8.518	9.681
					(2.214)***	(78.365)	(0.525)***	(0.788)***
Corresponding percentile from the loan size distribution					2	99	19	27
Observations	3,686	1,343	1,297	1,046	3,686	1,343	1,297	1,046
R^2	0.10	0.13	0.15	0.08	0.11	0.14	0.16	0.09

Notes: Dependent variable is defined $\ln(Xt)-\ln(Xt-1)$. Cash flow (collateral) loan dummy equals 1 if firm received credit based on cash flow (collateral) method in a given year. The critical log cash flow (collateral) loan size is calculated by dividing the coefficient of cash flow (collateral) loan by the coefficient of cash flow (collateral) loan × log loan size. All regressions include industry, country and year dummies. Micro firms have 1–5, small firms have 6–15, and medium-sized firms have 16 or more employees. Robust standard errors in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

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Table 7. Loan effects on employment

	Firms							
	All	**Micro**	**Small**	**Medium**	**All**	**Micro**	**Small**	**Medium**
Cash flow loan	0.077	0.053	0.056	0.078	−0.426	−0.223	−0.325	−0.282
	(0.013)***	(0.022)**	(0.019)***	(0.023)***	(0.064)***	(0.108)**	(0.111)***	(0.164)*
Collateral loan	0.14	0.184	0.151	0.074	−0.179	−0.633	0.082	−0.558
	(0.026)***	(0.080)**	(0.044)***	(0.029)**	(0.118)	(0.476)	(0.266)	(0.157)***
Log employment in 2001	−0.073	−0.141	−0.21	−0.166	−0.089	−0.145	−0.212	−0.176
	(0.008)***	(0.021)***	(0.030)***	(0.035)***	(0.009)***	(0.021)***	(0.030)***	(0.035)***
Cash flow loan × log loan size					0.056	0.034	0.042	0.036
					(0.007)***	(0.014)**	(0.012)***	(0.016)**
Collateral loan × log loan size					0.034	0.097	0.007	0.06
					(0.012)***	(0.062)	(0.027)	(0.015)***
Critical log cash flow loan size					7.573	6.543	7.685	7.904
					(0.269)***	(0.753)***	(0.569)***	(1.206)***
Corresponding percentile from the loan size distribution					19	8	15	5
Critical log collateral loan size					5.307	6.494		9.233
					(1.734)***	(0.975)***		(0.517)***
Corresponding percentile from the loan size distribution					1	13		15
Observations	3,724	1,346	1,315	1,051	3,724	1,358	1,315	1,051
R^2	0.08	0.09	0.21	0.21	0.10	0.10	0.21	0.21

Notes: Dependent variable is defined $\ln(Xt)-\ln(Xt-1)$. Cash flow (collateral) loan dummy equals 1 if firm received credit based on cash flow (collateral) method in a given year. The critical log cash flow (collateral) loan size is calculated by dividing the coefficient of cash flow (collateral) loan by the coefficient of cash flow (collateral) loan × log loan size. All regressions include industry, country and year dummies. Micro firms have 1–5, small firms have 6–15, and medium-sized firms have 16 or more employees. Robust standard errors in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

Table 8. Loan effects on net profit

	Firms							
	All	Micro	Small	Medium	All	Micro	Small	Medium
Cash flow-based loan	0.096	0.116	0.098	0.061	−0.226	−0.251	−0.041	−0.230
	(0.025)***	(0.038)***	(0.042)**	(0.057)	(0.113)**	(0.199)	(0.252)	(0.260)
Collateral-based loan	0.092	0.143	0.185	−0.050	−0.302	−0.363	−0.821	−0.582
	(0.045)**	(0.101)	(0.078)**	(0.073)	(0.216)	(0.525)	(0.410)**	(0.323)*
Log net profit in 2001	−0.048	−0.068	−0.082	−0.035	−0.055	−0.075	−0.085	−0.042
	(0.008)***	(0.016)***	(0.015)***	(0.016)**	(0.009)***	(0.017)***	(0.015)***	(0.017)**
Log loan size * Cash flow-based loan					0.036	0.045	0.016	0.029
					(0.013)***	(0.025)*	(0.028)	(0.025)
Log loan size * Collateral-based loan					0.041	0.060	0.106	0.051
					(0.022)*	(0.062)	(0.043)**	(0.030)*
Critical log cash flow-based loan size					6.247	5.522	2.608	7.932
					(1.099)***	(1.525)***	(11.555)	(2.713)***
Corresponding percentile from the loan size distribution					2	1	98	5
Critical log collateral-based loan size					7.374	6.007	7.766	11.475
					(1.640)***	(2.861)**	(0.951)***	(1.572)***
Corresponding percentile from the loan size distribution					8	9	5	78
Observations	3,444	1,253	1,214	977	3,444	1,253	1,214	977
R^2	0.04	0.05	0.07	0.03	0.04	0.05	0.07	0.04

***Notes*:** Dependent variable is defined $\ln(Xt)-\ln(Xt-1)$. Cash flow (collateral) loan dummy equals 1 if firm received credit based on cash flow (collateral) method in a given year. The critical log cash flow (collateral) loan size is calculated by dividing the coefficient of cash flow (collateral) loan by the coefficient of cash flow (collateral) loan × log loan size. All regressions include industry, country and year dummies. Micro firms have 1–5, small firms have 6–15, and medium-sized firms have 16 or more employees. Robust standard errors in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

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flow loans, the effects of the two types of loans in terms of dollars of fixed assets generated by a dollar of loan may be argued to be similar.[25]

The results based on firm size, reported in columns 2–4, indicate that both cash flow and collateral loans have a positive relationship with capital formation of all firm sizes. Moreover, for cash flow loans the percentage effect rises and becomes more statistically significant with firm size, while the relationship with collateral loans is more uniform. Overall, the results in the first part of Table 5 provide support for the anecdotal assertion that the award of a (relatively short term) loan is associated with higher fixed assets growth.

The estimated effects of loan size on fixed assets are reported in the last four columns of Table 5. The effects of cash flow loans on fixed assets vary systematically with the size of the loan in all three types of firms, with the effect being negative for small loans and becoming positive as loan size increases. The same pattern is observed for collateral loans in small and medium-sized firms, while the effect in micro firms does not vary significantly with loan size. As the calculated critical (overtaking) values in the table indicate, for the sample as a whole the effect of cash flow loans (collateral loans) on fixed assets turns from negative to positive at the 21st (3rd) percentile of the cash flow loan (collateral loan) size distribution.[26] The estimates from regressions based on firm size in turn suggest that the critical cash flow loan values for micro, small and medium-sized firms are at the 25th, 9th and 21st percentile, respectively. The corresponding critical values of collateral loans for small and medium-sized firms are at the 6th and 5th percentile, respectively. The results hence suggest that most cash flow and collateral loans yield a positive relationship with growth of fixed assets. In most cases, the estimates also raise the issue that very small loans may have a negative association with fixed asset formation. In all regressions, the effect of the initial level of fixed assets is negative, as expected, indicating that the data display conversion to the mean – a phenomenon that we observe with respect to the other performance variables in the following tables as well.

The average effects of cash flow and collateral loans on firm revenues and employment growth are reported in Tables 6 and 7. On average, receiving a cash flow loan is related to 4.5 percent higher rate of growth of revenue than would be the case if the firm did not receive such a loan. The average effect of a collateral loan is estimated at 8.3 percent. Both cash flow and collateral loans have a positive relationship with the rate of growth of employment as well (7.7 and 14 percent, respectively). The estimated effects of cash flow and collateral loans in regressions based on firm size (columns 2–4) are positive and mostly statistically significant for both performance measures. The estimated effects of loans on revenues and employment

[25] The effect may be argued to be similar in terms of dollars of fixed assets in the sense that the effect (of an identically sized loan) is 5.23 percentage points for a firm with fixed assets twice as sizable as the fixed assets corresponding to the firm facing the 10.7 percentage point loan effect.

[26] The critical loan size values are reported only if either or both the loan dummy and the interaction of loan dummy and loan size variable are statistically significant.

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are hence broadly consistent with the corresponding positive effect of loans on fixed assets and they suggest that loan receivers become larger.

The estimated effects of the loan size on the rate of change of revenues and employment indicate that the effects of loans are negative for small loans and become positive as loan size increases. As with the effect on fixed assets, the results across size categories indicate that most cash flow and collateral loans yield a positive effect on the growth of revenues and employment, but that in some firm size categories the effect of the smallest loans may be negative. In estimations that we do not report here, we have also found a positive effect of loans on labour costs. The estimated coefficients from the labour cost regressions imply that the overall labour cost effect of loans is primarily accounted for by the positive effect of loans on employment rather than on wages (we can derive wage per employee from labour cost and we can show that this was not affected by the loans received).[27]

Since revenues and costs are the two principal components of profit, we have also examined directly the effect of loans on profit (see Table 8). We find that the effect of the two types of loans on profitability is also positive and statistically significant (1st column of Table 8). Our results with respect to revenues and profit hence suggest that receiving a loan is related to increased scale of operations and higher profits.

6. Conclusions

Our analysis of micro, small and medium-sized enterprises (MSMEs) permits us to draw two sets of interesting conclusions, one with respect to the allocation of credit and one with respect to the effects on firm performance of two types of loans – a new type of loan based on cash flow that was pioneered and spearheaded by EBRD in the transition economies and a traditional-style loan based on collateral.

With respect to the allocation of credit, we find that MSMEs that received a cash flow or collateral loan in the past are more likely to receive the same type of loan, and also a larger sized loan of the same type, in the future. This finding may reflect the fact that firms that received a given loan in the past are more likely to apply to the same lender and/or that the lender is more likely to lend to firms to which he/she lent in the past. Interestingly, the effect of having received a cash flow loan in the past has a negative effect on the probability of receiving a collateral loan in the future, while the same negative cross-effect from receiving collateral loans in the past on the probability of receiving a cash flow loan is statistically

[27] A separate set of results is received by analysing the capital–labour ratio, which was proxied by the fixed assets to total employment ratio. We found that receiving a loan has no significant effect on the change of this variable. This confirms the finding that both fixed assets and employment are affected positively by loans and we cannot find a larger tendency in one or in the other. These results are available on request.

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insignificant for micro and small firms. These results suggest that we observe a mixture of two effects. First, it appears that cash flow loans are the preferred form of credit in the sense that once MSMEs of any size receive this type of loan they are more likely to receive another in the future and less likely to obtain a collateral loan in the future. This hypothesis is also supported by the finding that micro and small firms are unaffected in their probability of obtaining a cash flow loan in the future by having received a collateral loan in the past. The second effect seems to be that banks and clients develop a specific relationship that makes them more likely to deal with each other over time and less likely to switch to another partner (relationship banking). This may be viewed as a form of market segmentation and it is consistent with findings based on US small and medium-sized firms. In particular, Petersen and Rajan's (1994) findings suggest that bank relationships are valuable to small firms.

With respect to the effect of credit on performance, we show that both cash flow loans and collateral loans are positively related to a number of key performance indicators of small and medium-sized enterprises. In the case of microenterprises, the association of these loans with performance is also found to be generally positive but somewhat less significant. Both types of loans have an overall positive relationship with fixed asset formation, suggesting that firms use both types of bank loans for investment in fixed capital. In terms of dollars of fixed assets generated by a dollar of loan, the effects of the two types of loans are similar.

Both cash flow and collateral loans also by and large display a positive relationship with revenues and employment. In particular, the overall estimates for all firms indicate that the loans enable the MSMEs to expand production beyond the scale that they could have achieved without this source of credit. Finally, there is also a positive relationship between both types of loan and profitability.

Our estimates also suggest that while cash flow and collateral loans are positively related to various performance indicators, in many cases the performance effects of the smallest size loans may be negative. This could be interpreted in two different ways. First, that the microenterprises awarded with the smallest size loans are the poorest and use loan proceeds for purposes defined as wasteful from an enterprise point of view – that is, loan proceeds may be used to finance consumption/survival of the entrepreneur's household. Second, that the microenterprises awarded with the smallest loans are first-time borrowers who are not as experienced or as successful entrepreneurs as those who are awarded larger loans, and thus might be less efficient in the use of funds made available to them. This finding has implications for lending policies and deserves more in-depth investigation in future research.

Finally, from the policy standpoint it is important to note that it is easier and faster for MSMEs to qualify for the cash flow loans than collateral loans. In our sample, we also see that most of the collateral loans obtained by control firms have been received by medium-sized firms, while the allocation of cash flow loans was

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relatively even across all the firm size groups. This suggests that cash flow loans can play an important part in credit provision to micro and small enterprises that may be overlooked by the traditional collateral-based loan providers. Overall, our data and analysis suggest that the EBRD spearheaded programme of cash flow loans has been a success.

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Appendix 1

Panel A – Summary statistics for micro firms (1–5 employees)

	Control group			Treatment group		
	Mean	**Median**	**SD**	**Mean**	**Median**	**SD**
2001						
Revenue	42	16	74	99	27	455
Investment	2	0	5	5	1	12
Fixed assets	7	2	23	34	3	218
Net profit	8	3	17	40	6	332
Total employment	3	3	1	3	3	1
Leverage	3	0	12	5	0	12
Number of firms with independent auditors	12			19		
Number of cash flow loans				91		
Cash flow loan size				5	2	7
Number of collateral loans	6			9		
Collateral loan size	11	8	14	4	3	3
Number of firms	146			330		
2004						
Revenue	41	16	78	51	31	68
Investment	2	0	5	5	1	15
Fixed assets	8	3	14	14	3	29
Net profit	6	3	12	12	7	19
Total employment	3	3	1	3	3	1
Leverage	4	0	11	11	1	18
Number of firms with independent auditors	19			23		
Number of cash flow loans				159		

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Appendix 1. (Continued)

Panel A – Summary statistics for micro firms (1–5 employees)						
	Control group			Treatment group		
	Mean	Median	SD	Mean	Median	SD
Cash flow loan size				7	3	13
Number of collateral loans	10			8		
Collateral loan size	11	4	17	24	15	30
Number of firms	140			279		
Panel B – Summary statistics for small firms (6–15 employees)						
	Control group			Treatment group		
	Mean	Median	SD	Mean	Median	SD
2001						
Revenue	141	66	276	171	77	378
Investment	8	0	26	7	2	17
Fixed assets	23	9	50	47	13	175
Net profit	32	7	117	42	12	191
Total employment	9	9	3	10	9	3
Leverage	7	0	17	10	0	17
Number of firms with independent auditors	22			31		
Number of cash flow loans				94		
Cash flow loan size				9	5	11
Number of collateral loans	8			19		
Collateral loan size	39	17	47	11	5	12
Number of firms	124			270		
2004						
Revenue	166	62	381	154	77	293

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Appendix 1. (Continued)

Panel B – Summary statistics for small firms (6–15 employees)

	Control group			Treatment group		
	Mean	Median	SD	Mean	Median	SD
Investment	5	0	11	9	3	20
Fixed assets	28	8	64	50	17	173
Net profit	31	10	85	30	13	91
Total employment	10	9	3	10	10	3
Leverage	9	0	17	14	5	19
Number of firms with independent auditors	31			44		
Number of cash flow loans				156		
Cash flow loan size				16	7	25
Number of collateral loans	28			15		
Collateral loan size	15	9	16	20	8	27
Number of firms	151			272		

Panel C – Summary statistics for medium-sized firms (16 or more employees)

	Control group			Treatment group		
	Mean	Median	SD	Mean	Median	SD
2001						
Revenue	1,136	218	4,602	399	152	729
Investment	35	5	105	31	7	94
Fixed assets	328	50	1,305	107	32	223
Net profit	94	28	220	96	27	310
Total employment	47	26	51	41	26	45
Leverage	18	2	20	9	0	17
Number of firms with independent auditors	56			37		

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Appendix 1. (Continued)

Panel C – Summary statistics for medium-sized firms (16 or more employees)

	Control group			Treatment group		
	Mean	**Median**	**SD**	**Mean**	**Median**	**SD**
Number of cash flow loans				67		
Cash flow loan size				33	13	48
Number of collateral loans	34			6		
Collateral loan size	71	25	113	23	24	14
Number of firms	131			180		
2004						
Revenue	1,370	286	4,028	804	245	2,326
Investment	67	13	205	59	13	147
Fixed assets	321	72	875	197	58	487
Net profit	147	34	372	302	35	2003
Total employment	48	31	44	49	29	48
Leverage	12	2	20	17	7	25
Number of firms with independent auditors	73			81		
Number of cash flow loans				166		
Cash flow loan size				43	21	68
Number of collateral loans	57			27		
Collateral loan size	59	20	109	47	19	77
Number of firms	157			273		

***Notes*:** Treatment group consists of MSMEs that had received a loan from one of eight EBRD-sponsored MSME lending projects in 2002. Control group consists of MSMEs that had never received an EBRD project loan. Financial data are expressed in thousands of USDs. Figures are adjusted to producer prices. For all countries, the country specific producer price index is used except for Russia for which the Nizhny Novgorod regional producer price index is used. Total employment is a full time equivalent of full-time, part-time and temporary employees. Leverage is defined as ratio of debt to debt plus equity.

Appendix 2. Financial intermediaries providing cash flow loans

Financial intermediaries	Country	Year programme started	Total number of MSME loans extended at end 2002 since beginning of programme	Total volume of MSME loans extended at end 2002 since beginning of programme (million Euros)	Loans in arrears over 30 days as % of outstanding MSME loan portfolio	Average MSME loan maturity for loans extended in 2002 (number of months)	Number of branches at end 2002	Number of loan officers at end 2002	Average borrower size in terms of number of employees
Procredit Bank Bulgaria	Bulgaria	2002	5,919	39.6	0.0	16	10	38	28
Procredit Bank Georgia	Georgia	1999	9,973	47	3.1	18	16	12	4
KMB	Russia	1998	28,819	220.4	1.0	18	66	61	11
Procredit Bank Ukraine	Ukraine	2001	7,518	42	0.5	16	18	70	12
Hebros Bank	Bulgaria	2001	284	7.7	0.0	18	35	43	25
Tbiluniversal Bank	Georgia	2000	300	1.4	0.0	18	2	9	5
NBD	Russia	1998	1,484	10.1	1.0	na	10	22	na
Private Bank	Ukraine	1999	4,411	24.4	0.6	11	45	130	11

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